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1. Data Set Description:

The overall goal of the St. Louis - Midwest Supersite was to conduct aerosol physical and chemical measurements needed by the health effects community, the atmospheric science community and the regulatory community to properly assess the impact of particulate matter exposure on human health and to develop control strategies to mitigate these effects. Metropolitan St. Louis is a major population center (2.5 million) well isolated from other urban centers of even moderate size, and is impacted by both distant and local sources. Local industry includes manufacturing, refining, and chemical plants. St. Louis is climatologically representative of the country's eastern interior, affected by a wide range of synoptic weather patterns and free of localized influences from the Great Lakes, Ocean, Gulf, and mountains. It accordingly provides an ideal environment for studying the sources, transport, and properties of ambient particles.

Data Archive

Data files from all components of the **St. Louis - Midwest Supersite** program are archived in this single data set. Time-series plots are included for all of the numeric variables in each of the data files. These plots are useful for screening for outliers and visualization of values less than the detection limit and values with other quality flags. QA plans and the final St. Louis - Midwest Supersite report are included as documentation.

The initial data types archived include:

- 5-minute PM 2.5 black carbon (880 nm) and uv-absorbing carbon (370 nm) measured by a Magee Scientific Aethalometer (Model AE-21).
- 1-hour PM 2.5 elemental carbon and blank-corrected organic carbon from semicontinuous thermo-optical analysis by the ACE-ASIA method.
- 24-hour PM 2.5 elemental carbon and organic carbon (both blank-corrected) from integrated filter with offline thermo-optical analysis by the ACE-ASIA method.
- 30-minute PM 2.5 metal composition from samples collected with a Semicontinuous Elements in Aerosol Sampler (SEAS) II (see description below).
- 5-minute meteorological data (wind, temperature, RH, solar radiation, atmospheric pressure, and precipitation) measured with a Climatronics anemometer, wind vane, thermocouple, lithium chloride sensor, pyranometer, barometer, and tipping bucket.
- 24-hour PM 1.0 filter mass concentration measured by sharp cut cyclone and gravimetric analysis
- 1-hour PM 2.5 mass measured by an Andersen CAMMS (Continuous Ambient Mass Monitoring System)
- 24-hour PM 2.5 and PM 10 filter mass by Harvard Impactors and laboratory gravimetric analysis

Program Objectives

1. Implement and evaluate highly time-resolved particle measurement techniques.
2. Characterize spatial and temporal (from minutes up to 24 hours) patterns of a large spectrum of particle physical and chemical properties in the St. Louis metropolitan area.
3. Investigation of particle health effects.

Program Results



The scientific findings are reported in the EPA PM Supersite Final Report for the St. Louis - Midwest Supersite. The results have been organized around the three major objectives and include associated citations to papers from the research conducted within the program. The [EPA PM Supersite Final Report](#) (PDF) is provided as a companion file.

Ambient Particulate Matter Measurement Methods: This study provided numerous opportunities to evaluate emerging and recently-commercialized methods for measuring ambient aerosol chemical and physical properties.

Aerosol Climatology and Source-Receptor Relationships: The Supersite data set and allied data sets for the St. Louis metropolitan area have been used to elucidate spatial and temporal variability for several aerosol chemical and physical properties. These data are being used to: develop source/receptor models and determine source/receptor relationships for St. Louis; identify and examine the sources, formation processes and physical chemical properties of ambient particles; and support State Implementation Plan (SIP) development.

Data and Samples to Support Exposure and Health Effects Studies: The St. Louis Supersite data are being used to investigate relationships between air quality parameters and various health and toxicological endpoints. These projects are funded separate from the Supersites program but draw upon the St. Louis Supersite data (and in some cases the operations infrastructure) and thereby represent significant leveraging of investment in the St. Louis Supersite project.

The **St. Louis - Midwest Supersite** is one of several Supersites that was established in urban areas within the United States by the U.S. Environmental Protection Agency (EPA) to better understand the measurement, sources, and health effects of suspended particulate matter (PM).

The St. Louis - Midwest Supersite, in Metropolitan St. Louis (IL-MO), a major industrial and population center was a comprehensive research program that provided physical and chemical measurements needed by the health effects, atmospheric science and regulatory communities, in a setting broadly representative of the urban Midwest. The site is located at 13th and Tudor in East St. Louis (IL) approximately 3 km east of the City of St. Louis (MO) central business district, [Latitude 38.6122, Longitude -90.16028]. The site is primarily residential with some light commercial activities. A variety of transportation-related and industrial sources can impact this site as the emission fields are spatially heterogeneous.



Supersite core site infrastructure.

The [U.S. EPA Particulate Matter \(PM\) Supersites Program](#) was an ambient air monitoring research program from 1999-2004 designed to provide information of value to the atmospheric sciences, and human health and exposure research communities. Eight geographically diverse projects were chosen to specifically address these EPA research priorities: (1) to characterize PM, its constituents, precursors, co-pollutants, atmospheric transport, and its source categories that affect the PM in any region; (2) to address the research questions and scientific uncertainties about PM source-receptor and exposure-health effects relationships; and (3) to compare and evaluate different methods of characterizing PM including testing new and emerging measurement methods. Data collected by these projects are publicly available at the NARSTO Permanent Data Archive, NASA Langley DAAC. Data users should acknowledge the U.S. EPA Particulate Matter (PM) Supersites Program and the project investigator(s) listed below.

Acknowledgments

The St. Louis - Midwest Supersite commenced detailed measurements of ambient particulate matter (PM) in the St. Louis area in April 2001 with some measurements sustained through March 2005. This four-year measurement program was funded by various organizations. A cooperative agreement between USEPA OAQPS/ORD and Washington University established the foundation for the program (including infrastructure) and supported one year of measurements (April 2001 - May 2002). A grant through USEPA Region VII, with contributions from USEPA, Missouri DNR, CENRAP and LADCO/MRPO, permitted a majority of the initial measurement platform to be sustained through at least May 2003. Subsequently, LADCO/MPRO funded a skeletal suite of measurements through March 2005. Portions of the measurement program were also funded by the Electric Power Research Institute (EPRI).

Citing the Data Set

The dataset should be cited as follows:

Turner, Jay R, James Schauer and Petros Koutrakis. 2009. NARSTO EPA_SS_ST_LOUIS Air Chemistry, Particulate Matter, and Meteorological Data. Available on-line via [NARSTO Data and Information](#) at the Atmospheric Science Data Center at NASA Langley Research Center, Hampton, Virginia, U.S.A.

More information can be found at the St Louis Midwest Supersite



Distributed by the Atmospheric Science Data Center
<http://eosweb.larc.nasa.gov>



2. Sample Data Record/Data Format:

Data files are in the NARSTO Data Exchange Standard (DES) format that is described in detail on the [NARSTO Quality Systems Science Center \(QSSC\) web site](#). The files follow a tabular layout and are stored as ASCII comma-separated values files (.csv). The DES does not rely on row position to identify specific information, but uses a tag to describe the information contained in the row. The DES is a self-documenting format with three main sections: the header contains information about the contents of the file and the data originator; the middle section contains metadata tables that describe/define sites, flags, and other codified fields; and the final section is the main data table that contains key sampling and analysis information and the data values. Descriptions of the standardized metadata fields are also available on the QSSC web site.

Notes about the MET and the PM files

The QSSC made some flagging-related and some formatting changes to these files before publishing them. In some files, as noted in a *COMMENT statement at the top, some non-missing data having missing value flags were changed to the missing code. Some of the study flags are not defined. In the meteorological files NARSTO_EPA_SS_ST_LOUIS_MET_5MIN_20010508_20011130_V1.csv and NARSTO_EPA_SS_ST_LOUIS_MET_5MIN_20011201_20020531_V1.csv, the variable "Radiation: spectral downwelling solar hemispheric irradiance" has several-orders-of-magnitude lower values for the period from September 1, 2001 through December 31, 2001.

Time-Series Plots

Time-series plots are included for the numeric variables in each of the data files. These plots are useful for screening for outliers, and for visualization of values that may be less than the detection limit and values with quality flags, as well as for seeing patterns in the data. Links to the plots for each data file are included in the following table.

Data Types	Data File Names	QC Level	Links to Time-Series Plots (PDF)
Aethalometer	NARSTO_EPA_SS_ST_LOUIS_AETH_5MIN_20010411_20010630_V1.csv	2	AETH 5MIN 20010411 20010630_V1
	NARSTO_EPA_SS_ST_LOUIS_AETH_5MIN_20010701_20010930_V1.csv	2	AETH 5MIN 20010701 20010930_V1
	NARSTO_EPA_SS_ST_LOUIS_AETH_5MIN_20011001_20011231_V1.csv	2	AETH 5MIN 20011001 20011231_V1
	NARSTO_EPA_SS_ST_LOUIS_AETH_5MIN_20020101_20020331_V1.csv	2	AETH 5MIN 20020101 20020331_V1
	NARSTO_EPA_SS_ST_LOUIS_AETH_5MIN_20020401_20020630_V1.csv	2	AETH 5MIN 20020401 20020630_V1
Elemental Carbon / Organic Carbon	NARSTO_EPA_SS_ST_LOUIS_ECOC_1HOUR_20010411_20030430_V1.csv	2	ECOC 1HOUR 20010411 20030430_V1
	NARSTO_EPA_SS_ST_LOUIS_ECOC_24HOUR_20010414_20030720_V1.csv	2	ECOC 24HOUR 20010414 20030720_V1
Semicontinuous Elements in Aerosol Sampler	NARSTO_EPA_SS_ST_LOUIS_SEAS_PM25_METALS_V1.csv	2	SEAS PM25 METALS_V1
Meteorological Data	NARSTO_EPA_SS_ST_LOUIS_MET_5MIN_20010508_20011130_V1.csv	2	MET 5MIN 20010508 20011130_V1
	NARSTO_EPA_SS_ST_LOUIS_MET_5MIN_20011201_20020531_V1.csv	2	MET 5MIN 20011201 20020531_V1
	NARSTO_EPA_SS_ST_LOUIS_MET_5MIN_20020601_20020630_V1.csv	2	MET 5MIN 20020601 20020630_V1



	V1.csv		
Particulate Matter	NARSTO_EPA_SS_ST_LOUIS_P M-1-24HR_20010413_20011231_ V1.csv	1	PM-1-24HR_20010413_20011231_V1
	NARSTO_EPA_SS_ST_LOUIS_P M-1-24HR_20020101_20020531_ V1.csv	1	PM-1-24HR_20020101_20020531_V1
	NARSTO_EPA_SS_ST_LOUIS_P M25_1HOUR_20010415_200306 30_V1.csv	2	PM25_1HOUR_20010415_20030630_V1
	NARSTO_EPA_SS_ST_LOUIS_P M25_24HOUR_20010413_20030630_V1.csv	2	PM25_24HOUR_20010413_20030630_V1
	NARSTO_EPA_SS_ST_LOUIS_P M10_24HOUR_20010413_20020531_V1.csv	2	PM10_24HOUR_20010413_20020531_V1

University of Maryland Semicontinuous Elements in Aerosol Sampler (SEAS) II

Simultaneous multielement graphite furnace atomic absorption spectrometry was used to determine Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Sb, Se, and Zn in ambient air sampled at 90 L/min for 30 min and collected as a slurry after dynamic preconcentration.

Air was sampled at a flow rate of 90 L/min and particles grown by condensation of water vapor in a condenser maintained at 0.5 degrees C after saturation by direct injection of steam. The resulting droplets were concentrated 13.6 fold using a single-nozzle virtual impactor and collected in a liquid slurry with a real impactor in an all glass and plastic system. The system delivered an aerosol slurry at a rate of 0.2 mL/min, i.e., suitable for analysis by multielement graphite-furnace atomic absorption spectrometry, with system blanks adequate to permit quantitative analysis of Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Sb, Se, and Zn in ambient aerosol samples.

3. References:

See list of references and presentations in [EPA PM Supersite Final Report](#) for the St. Louis - Midwest Fine Particulate Matter Supersite, March 2007. (PDF)

4. Contact Information:

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Data Center:

The User and Data Services Office at the Langley Atmospheric Science Data Center is involved throughout the system to monitor the quality of data on ingest, to ensure prompt replies to user questions, to verify media orders prior to filling them, and to ensure that the needs of the users are being met.

If you have a problem finding what you need, trouble accessing the system, or need an answer to a question concerning the data or how to obtain data, please contact the Users and Data Services staff.

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5. Acknowledgement:

When data from the Langley Atmospheric Science Data Center are used in a publication, we request the following acknowledgment be included: "These data were obtained from the NASA Langley Research Center Atmospheric Science Data Center".

The Langley Data Center requests a reprint of any published papers or reports or a brief description of other uses (e.g., posters, oral presentations, etc.) of data that we have distributed. This will help us determine the use of data that we distribute, which is helpful in optimizing product development. It also helps us to keep our product-related references current.

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